

What is claimed is:

Sub  
a1

1.

An apparatus for optically generating signals, the apparatus comprising:

- (a) a mode-locked semiconductor laser that generates mode-locked optical radiation with emitted wavelengths separated by approximately 10 GHz to approximately 300 GHz;
- (b) an optical demultiplexer with a demultiplexer input, a first demultiplexer output, and a second demultiplexer output, the demultiplexer input being coupled to said mode-locked semiconductor laser;
- (c) an optical modulator having a modulator input and a modulator output, the modulator input being coupled to the first demultiplexer output; and
- (d) an optical multiplexer having a first multiplexer input, a second multiplexer input, and a multiplexer output, the first multiplexer input being coupled to the modulator output, the second multiplexer input being coupled to said second demultiplexer output.

Sub  
a2

2.

The apparatus of claim 1, wherein the mode-locked semiconductor laser is a semiconductor racetrack laser.

3.

The apparatus of claim 1, wherein the optical modulator is a Mach-Zehnder modulator.

4.

The apparatus of claim 1, further including processing electronics coupled to the optical multiplexer output, the processing electronics containing components necessary for downconverting the data signal received from the optical multiplexer.

Sub  
a2

5.

An apparatus for generating optical signals, the apparatus comprising:

- (a) means for generating mode-locked optical radiation;

- [illegible]